

ENGLISH TRANSLATION OF THE INTERNATIONAL APPLICATION
FOR NATIONAL PHASE SUBMISSION

Claims

1. Injection unit for an internal combustion engine, comprising

- a pressure reservoir (12) for storing fuel pumped into the pressure reservoir from a fuel tank (16) by means of a high-pressure pump (14), and
- an injector arrangement (20), connected to the pressure reservoir (12) by means of a pressure line arrangement (18), for injecting the fuel into the internal combustion engine,

wherein the injector arrangement (20) comprises at least one servo injection valve in which both a nozzle chamber and a control chamber are supplied with fuel from the pressure reservoir (12) via a pressure line and in which a nozzle body for opening and closing an injection passage leading from the nozzle chamber to a combustion chamber is displaceably guided, and the nozzle body is exposed at its end facing the injection passage to the pressure of the fuel in the nozzle chamber and at its opposing end to the pressure of the fuel in the control chamber,

wherein the servo injection valve is provided with a control valve for the release of fuel from the control chamber into a fuel return line (22) leading to the fuel tank (16), which control valve may be operated by means of a piezoelectric actuator to cause a displacement of the nozzle body in the

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direction of an opening of the injection passage, for initiating an injection process by pressure reduction in the control chamber, characterized in that the fuel return line (22) is provided with a controllable valve (40) which in an actuated state blocks the fuel flow in the fuel return line (22), wherein the valve (40) is actuated depending on predefined operating parameters of the internal combustion engine and/or the injection unit and is returned to an idle state only after expiration of a predetermined time interval.

2. Injection unit according to claim 1, wherein the injector arrangement (20) comprises a plurality of servo injection valves which are connected via the pressure line arrangement (18) to the pressure reservoir (12) used jointly for this plurality of servo injection valves.

3. Injection unit according to claim 1 or claim 2, wherein the injector arrangement (20) comprises a plurality of servo injection valves whose fuel return lines (22) are combined, whereby the combined fuel return line section is provided with the controllable valve (40).

4. Injection unit according to claim 1, 2 or 3, wherein the predefined operating parameters comprise the existence or non-existence of an actuator overshoot in the servo injection valve.

5. Injection unit according to any one of claims 1 to 4,

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wherein the idle state of the valve (4) after an actuation is maintained compulsorily for a stipulated fixed further time interval.

6. Injection unit according to any one of claims 1 to 5, further comprising an electronic injection control unit (ECU) for operating the injector arrangement (20) and for actuating the controllable valve (40).

7. Method for operating an injection unit (10) for an internal combustion engine, wherein the injection unit comprises:

- a pressure reservoir (12) for storing fuel pumped into the pressure reservoir from a fuel tank by means of a high-pressure pump, and
- an injector arrangement (20), connected to the pressure reservoir (12) via a pressure line arrangement (18), for injecting the fuel into the internal combustion engine,

wherein the injector arrangement comprises at least one servo injection valve in which both a nozzle chamber and a control chamber are supplied with fuel from the pressure reservoir via a pressure line and in which a nozzle body for opening and closing an injection passage leading from the nozzle chamber to a combustion chamber is displaceably guided, and the nozzle body is exposed at its end facing the injection passage to the

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pressure of the fuel in the nozzle chamber and at its opposing end to the pressure of the fuel in the control chamber,

wherein the servo injection valve is provided with a control valve for the release of fuel from the control chamber into a fuel return line leading to the fuel tank,

wherein the method comprises the step of actuation of the control valve by means of a piezoelectric actuator, to cause a displacement of the nozzle body in the direction of an opening of the injection passage, for initiating an injection process by pressure reduction in the control chamber,

characterized by a blocking of the fuel flow in the fuel return line (22), said blocking being provided depending on predefined operating parameters of the internal combustion engine and/or of the injection unit and not being lifted again until after expiration of a predetermined time interval.

8. Method according to claim 7,

wherein the predefined operating parameters comprise the existence or non-existence of an actuator overshoot in the servo injection valve.

9. Method according to claim 7 or claim 8,

wherein the lifting of the blocking is compulsorily maintained for a stipulated fixed further time interval.